

## ABSTRACT

In general, the present invention is directed to systems and methods for  
5 finding the position and shape of an object using video. The invention includes  
a system with a video camera coupled to a computer in which the computer is  
configured to automatically provide object segmentation and identification, object  
motion tracking (for moving objects), object position classification, and behavior  
identification. In a preferred embodiment, the present invention may use  
10 background subtraction for object identification and tracking, probabilistic  
approach with expectation-maximization for tracking the motion detection and  
object classification, and decision tree classification for behavior identification.  
Thus, the present invention is capable of automatically monitoring a video image  
to identify, track and classify the actions of various objects and the object's  
15 movements within the image. The image may be provided in real time or from  
storage. The invention is particularly useful for monitoring and classifying  
animal behavior for testing drugs and genetic mutations, but may be used in any  
of a number of other surveillance applications.